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AN ESTIMATE OF INDUSTRIAL CAPITAL, EMPLOYMENT, AND PRODUCTION IN NORTH CHINA DURING THE WAR (1938-1942)

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Pei-p'ing, 1947

I. INTRODUCTION

"North China" as we use the term means Hopei, Shantung, Shansi; Kiangsu and Honan, north of the Lunghai Railway; Chahar and Suiyuan. The last two and a portion of Shansi were called "Meng-chiang" by the Japanese; Hopeh, Shantung, the larger part of Shansi, and the northern section of Kiangsu and Honan were designated by the Japanese as the North China area. Therefore, in this article, North China is designated as the territory denoted by the Japanese terms "North China" and "Meng-chiang." This equating of regions is entirely for the convenience of statistics, since in estimating North China industrial capital and production we use Japanese statistics almost entirely.

The period of our estimate is from 1939 to 1942, the middle period of the war. Due to lack of data, we cannot estimate North China's industry for the whole war period. During these four years development was upward, as the reader will see. Before 1939, industry had not recovered from the shock of war. Japan's five-year plan for the industry of North China was carried out after 1942. In this plan, Japan had abandoned her former scheme -- of merely squeezing out resources -- for a project of long-term building up of North China industry. But, after 1943, Japan began to suffer reverses in the Pacific War; prices in North China fluctuated violently (Note 1; see explanation of notes at the end of this publication), adding

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to the burden of capitalization and difficulties of production. Therefore, the curve of industrial development of these four years cannot picture the entire war period.

Industry, as we use the term, means factory industry. A factory as defined in Chinese law means a power-using plant employing 30 or more operators, thus distinguishing between industry and handicraft. Therefore, the figures used herein do not relate to handicrafts.

In the four years with which we are concerned, figures are incomplete; in many places we need to add discretion to estimate. We can only draw the picture in outline and present general conclusions.

The Japanese made two general studies of North China industry -- once in 1940 and again in 1943. These studies have both been published: the first as a "List of North China Factories," the second by the same title, only using another name for China. These two studies are quite difficult and valuable, and embrace capital, number of workers, and value of products; hence, they are taken as a basis for our estimate for those years. Neither of these studies inclues Chahar and Suiyuan (Note 2); for these, information has been taken from the puppet Meng-chiang Bank's "Study of Factories and Products in Meng-chiang." This book uses the investigations of two Japanese, Tohara and Kamigawa, with statistics added. We have no way of finding the source materials which these men used, but their attitude is serious and wins our confidence. The only lack is that they do not include number of workers and that their figures are 1937-1941, with none for 1942. Here we can only estimate. Moreover, in the 1939 study, T'ien-ching (Tientsin) is not included; the investigators tell us that for this portion we may use the South Manchuria Railway's report on North China industries published in November 1939 (section on T'ien-ching). Actually, the figures given are pre-1938, and the explanation too vague and brief, hence unusable; while in the later discussion of individual enterprises, only a few large ones are noticed. We perforce used these data because there were none better; but 1939 figures for T'ien-ching had to be reduced (Note 3).

Figures for 1940 and 1943 are more complete than those for 1941 and 1942, hence the proportion of estimate is heavier in the last-named years, when no studies were made. There is only a "Table of Important Enterprises in North China and Meng-chiang," made at the end of 1941 by the Japanese War Department, which is fairly complete. Its concern was with the chief businesses, so, to align it with those of 1939 and 1942, we must add in the small factories employing more than 30 persons. These statistics also fell short in lumping the capital and totalling force for the two years and in giving only the amount and not the value of products. To get out of such data the figures we want demands fair suppositions and editorial discretion, as will be explained later.

Two points are to be noted:

1. The term "industries" means plants using power and employing 30 or more workers, including both profit and nonprofit concerns. In the study material used by us, no plants were

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investigated save those directly run for profit. Nondirect-profit enterprises weigh most heavily in the electric industry, because factories, mines, transportation, and cultural institutions have their own electric plants. None of these are profit concerns. We can only supply figures for production and workers and, perforce, value of products. As to capital, we have nothing to go by and hence must leave blank. For nondirect-profit concerns other than electric, we have figures only for Hopeh, and no way of supplementing for other provinces. Our chief sources are the "Table of Electric Equipment in North China" prepared by the North China Department of Communications and the "Study of Special Enterprises in Hopeh," prepared by the Industrial Department of the South Manchuria Railway.

2. After 1940, almost all electric plants in North China were in the hands of the North China Electric Company and the Meng-chiang Electric Company. These companies issued detailed annual reports — in the matter of electricity we use their figures, taken from these reports and from an account of the North China Development Company (Note 4).

II. STATISTICS OF INDUSTRIES IN NORTH CHINA

Our first step in estimating industries in North China is to get plant data in those four years. First, the studies (1939 and 1942) included plants using power and more than ten workers — a broader scope than we have decided on; those employing less than 30 must be expunged. Second, Japanese and international classification of enterprises are not much alike. The former divide industry into 11 types: textile, machine-tool, pottery, chemical, food, electric, woodworking, printing and bookbinding, and miscellaneous, etc. Our classification of industries follows the international; therefore, to use their data, we must reclassify. For these two reasons our figures for capital, employment, and production have to be calculated plant by plant — a laborious task. Results are tabulated in Tables 1 and 2.

Table 1. Industrial Plants in North China, by Industry (1939-1942)

Type of Industry	PLANTS									
	1939					1940				
	China	Japan	Sino-Jap	Other	Total	China	Japan	Sino-Jap	Other	Total
Lumbering	5	16	-	4	25	8	22	-	4	34
Machine-making	27	17	2	-	46	37	31	4	-	72
Metal goods	21	12	3	-	36	27	28	4	-	59
Electric appliances	1	1	-	-	2	1	6	-	-	7
Communications *	5	13	12	-	30	5	23	11	-	39
Earth & stone work	73	20	12	1	106	77	45	28	1	151
Hydroelectric	4	1	31	27	63	4	1	33	25	63
Chemical	34	17	11	-	62	38	30	11	-	79
Textile	132	27	6	4	169	166	48	7	4	225
Clothing	50	5	-	-	55	57	34	-	-	91
Leather	7	11	1	-	19	12	16	4	-	32
Beverage and food	52	23	10	9	94	63	45	14	9	146
Paper & printing	21	22	3	-	46	24	29	6	-	59
Ornaments	5	-	-	-	5	5	-	-	-	5
Miscellaneous	1	4	-	-	5	1	7	-	-	8
Total	438	189	93	45	763	530	365	132	43	1070

Table 1. (Contd)

Type of Industry	PLANTS									
	1941					1942				
	China	Japan	Sino-Jap	Other	Total	China	Japan	Sino-Jap	Other	Total
Lumbering	10	27	1	4	42	17	50	2	-	69
Machine-making	46	38	5	-	89	53	49	6	-	108
Metal goods	28	29	4	-	61	38	29	2	-	69
Electric appliances	3	7	-	-	10	8	12	2	-	22
Communications	5	23	14	-	42	9	25	16	-	50
Earth & stone work	84	61	29	1	175	100	95	26	1	222
Hydroelectric	4	1	39	19	63	4	1	63	-	68
Chemical	42	36	12	-	90	47	45	8	-	100
Textile	225	60	9	4	298	367	84	22	-	473
Clothing	66	43	-	-	109	56	93	-	-	149
Leather	13	17	4	-	34	10	23	4	-	37
Beverage and food	72	56	31	9	168	51	96	37	5	189
Paper & printing	27	33	7	-	67	42	43	9	-	94
Ornaments	5	-	-	-	5	4	1	-	-	5
Miscellaneous	2	7	-	-	9	2	7	-	-	9
Total	632	438	155	37	1,262	808	653	197	6	1,564

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Table 2. Industrial Plants in North China, by Location (1939-1942)

Province or City	PLANTS 1939 China	1939 Japan	1939 Sino-Jap	1939 Other	1939 Total	1940 China	1940 Japan	1940 Sino-Jap	1940 Other	1940 Total
Tien-ching	85	54	2	9	150	105	115	7	9	236
Pei-p'ing (Peking)	44	19	3	-	66	55	47	4	-	106
Ch'ing-tao (Tsingtao)	48	79	17	6	150	66	117	14	6	203
Hopeh	42	6	17	28	93	45	17	22	26	110
Shantung	152	19	13	2	186	179	41	15	2	237
Shansi	25	3	10	-	38	32	15	22	-	69
North Honan	28	5	-	-	33	32	8	3	-	43
North Kiangsu	14	4	1	-	19	16	5	3	-	24
Chahar-Suiyuan	-	-	28	-	28	-	-	42		42
Total	438	189	91	45	763	530	365	132		11,070

Table 2. (Contd)

Province or City	PLANTS 1941 China	Japan	Sino-Jap	Other	Total	1942 China	Japan	Sino-Jap	Other	Total
Tien-ching	147	131	8	9	295	255	225	17	3	500
Pei-p'ing (Peking)	65	60	5	-	130	98	89	6	-	193
Ch'ing-tao (Tsingtao)	83	130	13	6	232	127	151	12	-	290
Hopeh	48	29	27	20	124	70	55	63	1	189
Shantung	196	47	19	2	264	178	53	24	2	257
Shansi	44	21	23	-	88	61	55	5	-	121
North Honan	33	12	4	-	49	10	17	10	-	37
North Kiangsu	16	7	3	-	26	9	7	2	-	18
Chahar-Suiyuan	0	1	53	-	54	-	1	58	-	59
Total	632	438	155	37	1,262	808	653	197	6	1,664

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Explanation of Figures in Tables 1 and 2

1. In 1939 and 1942 the five North China provinces (excluding here Chahar and Suiyuan) were the subject of investigations which were fairly complete. So, besides adding one plant in communications for 1939 and one nonprofit plant in the metal and one in the paper and printing industry for 1939 and 1942, there has been no great addition. Again, in the 1939 study, there were some plants (not studied in detail or which were closed at the time), about which we have supplied information from other sources. Such additions have not changed the picture much.

The case is quite different for the years 1940 and 1941, when we have figures for only the most important plants. We have supplemented here according to the following principles: (a) Where plants were mentioned in 1939 but not in 1940 and 1941, we have retained all except those we positively know were closed after 1939 (this accounts for 482 plants); (b) Out of the 1942 list we have taken the plants founded in 1940 and in 1941 and added them to the numbers for those years, 214 and 390 respectively. We have also added the nonprofit plants and, to rectify any omissions, have put in any that we could discover from other sources; the East Asia mill is an example (Note 5). On the whole, those added are small; therefore, while the number of plants may be two or three times as large, the increase in workers was only 52 percent for 1940 and 60 percent in 1941, while the growth in capital was not as much as 20 percent either year.

2. The figures for Chahar and Suiyuan include plants employing five or more persons and exclude electric and repair and finishing plants. We should omit those employing less than 30, but, as said above, the original statistics are of secondary value. They only list the number of plants in each industry. We cannot find out about each plant, so can only give totals. We originally put electric plants in a category of their own; as for repair and finishing plants, we have only found one railway-car repair shop. There must be others, but with our limited data, we cannot put them in. The period covered by the original statistics is 1938-1941; there are no figures for 1942. These should be supplied, but we have no data; therefore we have to act on the assumption that there was no increase or diminution of plants in 1942. In other words, the figures are just the same for 1941 and 1942.

3. The hydroelectric industry is counted separately. For the five North China provinces, we follow in general the North China electric industry report. For Chahar and Suiyuan (previous to 1941), we follow the list of important enterprises in North China and Meng-chiang. For 1942 we use the figures of the time of reception (Note 6). For the number of hydroelectric plants, we only have figures for 1940 and 1941, and assume that they are the same for 1939 and 1942. This assumption has no basis, but we feel it is not unreasonable, for the adding or abandoning of a hydroelectric plant is a very difficult matter. As to coal-gas plants, there were none before the war, nor were any set up during the war (Note 7), so we need not list any.

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III. ESTIMATE OF INDUSTRIAL CAPITAL IN NORTH CHINA

We have not calculated the industrial capital for 1930, due to lack of data. We said above that in the statistics for 1940 and 1941 there were only very general figures for capital. This was just the period when Japanese investing reached its peak, so, as regards those statistics, there must have been some change. The date of investigation was the end of December 1941 and should represent conditions of that year. We have some scattered data for 1940, but in scope and quality far short of demand, so we prefer leaving a blank rather than carelessly to put down statistics for which there is no basis. As to capital in Chahar and Suiyuan in 1942, we have substituted 1941 figures except in the communications equipment and hydroelectric industries. Of course this runs counter to the principle stated above, but (1) the portion of Chahar and Suiyuan in the total North China industry is very small, and (2) because in the most important field of investment — hydroelectric — we have used the 1942 figures. Our substituting the 1941 figures for the other industries does not affect the accuracy of the total industrial picture. The reader should excuse deficiencies.

As to figures for capital, our principle is to use paid-up capital as the basis for statistics. However, in the aforesaid studies of 1939 and 1942, there are three types of statistics — subscribed, paid-up, and actual capital. In our opinion, paid-up capital is of course the amount originally paid in. Actual capital is perhaps the original capital plus the company's accumulated earnings over a period of years, for there is often a vast difference between these two amounts. A company's savings should be considered accumulated capital; its losses should be considered as expenditure of capital. Therefore, if our view is correct, in estimating industrial capital, actual capital unquestionably suits our needs best. Again, the operating form of North China plants is most commonly that of individual capital; share companies only occupy a very small part. But individual capital plants have only statistics of actual capital; as a rule they lack figures for subscribed or paid-up capital. For these two reasons, in the 1939 and 1942 statistics of plant capital for the five provinces of North China, we have used only figures of actual capital. Where actual capital is not stated, we have always used paid-up capital as the basis for estimates.

As to ownership of capital, we have made four categories: Chinese, Japanese, Sino-Japanese, and other foreign capital. This demarcation was at first very difficult. For example, army-controlled plants were originally all Chinese. After Japan had occupied them, capital would often be increased, and after such increase, theoretically the plant should be considered a joint enterprise. But statistics of the increase of capital were lacking. Furthermore, the purchase and return of Chinese plants meant a shift in the category of capital ownership; on these statistics and the price agreement of the plant we are none too clear. Again, the capital of plants in Chahar-Suiyuan is on the original statistics reckoned according to place of origin, namely Japan, Manchuria, North China, and the locality in question. The categories of Japan, North China, and the locality are easy to demarcate; but whether the capital invested from Manchuria is Chinese or Japanese is a difficult question. These questions are merely a few of the outstanding ones; others concerned with the demarcation of capital in individual plants

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are exceedingly minute. Our guiding principle has been to adopt fair decisions, and not go too much into particulars. Tables 3 and 4 are divided according to industry and location.

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Type of Industry	China	Japan	1942 Sino-Jap	CAPITAL Other	(thousand yuan) Total
Lumbering	3,743	26,708	1,200	-	31,651
Machine-making	6,022	40,224	3,158	-	49,504
Metal goods	12,075	63,973	525	-	79,573
Electric appliances	2,390	7,994	1,625	-	12,009
Communications "	1,027	43,832	95,370	-	140,229
Earth & stone work	47,498	21,788	16,376	1,000	86,662
Hydroelectric	16,220	2,600	166,620	-	184,840
Chemical	23,834	59,166	10,858	-	93,858
Textile	77,590	454,693	64,003	-	635,686
Clothing	7,484	29,837	-	-	37,321
Leather	21,092	29,838	1,850	-	52,780
Beverage and food	63,061	301,924	27,216	5,032	407,233
Paper and printing	16,641	16,401	35,651	-	68,723
Ornaments	2,402	95	-	-	2,497
Miscellaneous	105	5,140	-	-	5,245
Total	304,184	1,143,013	434,562	6,032	1,887,811

Table 3. Industrial Capital in North China, by Industry (1939-1942)

CAPITAL (thousand yuan)

Type of Industry	1939 China	Japan	Sino-Jap	Other	Total	1941 China	Japan	Sino-Jap	Other	Total
Lumbering	528	8,926	-	1,235	10,689	1,358	8,651	500	1,235	11,744
Machine-making	1,016	3,344	2,000	-	6,360	3,603	19,605	3,930	-	27,138
Metal goods	1,056	2,743	7,354	-	11,153	2,030	52,572	31,556	-	86,158
Electric appliances	3	15	-	-	18	584	2,553	-	-	3,137
Communications "	456	3,473	97,480	-	101,409	4,029	45,474	101,093	-	150,596
Earth & stone work	20,840	1,290	3,878	350	26,358	26,535	12,345	11,134	350	50,760
Hydroelectric	16,220	2,000	27,950	16,270	62,440	16,220	2,000	105,670	9,786	133,676
Chemical	9,299	7,844	7,193	-	24,336	6,833	31,718	10,113	-	48,664
Textile	30,398	161,513	6,605	650	199,166	57,195	555,145	5,032	650	618,022
Clothing	680	936	-	-	1,616	1,873	14,768	-	-	16,641
Leather	329	10,394	700	-	11,423	2 427	35,250	4,502	-	42,179
Beverage and food	18,437	22,363	5,805	6,792	53,657	39,531	326,122	25,088	3,812	394,553
Paper & printing	7,803	9,975	3,719	-	21,497	11,234	14,513	8,440	-	34,187
Ornaments	359	-	-	-	359	167	-	-	-	167
Miscellaneous	6	2,205	-	-	2,211	81	2,792	-	-	2,873
Total	107,490	237,221	162,684	25,297	532,692	174,096	1,123,508	307,058	15,833	1,620,495

Table 4. Industrial Capital in North China, by Location (1939-1942)

Province or City	CAPITAL (thousand yuan) 1939 China	Japan	Sino-Jap	Other	Total	1941 China	Japan	Sino-Jap	Other	Total
T'ien-ching	30,880	94,520	4,000	6,630	136,030	46,422	542,812	5,696	3,630	598,560
Pei-p'ing	15,753	873	3,750	-	20,376	27,165	50,453	19,429	-	97,047
Ch'ing-tao	7,199	132,768	13,748	1,635	155,350	27,845	464,411	12,620	1,655	506,531
Hopeh	23,558	1,845	108,570	16,620	150,593	29,403	16,619	180,338	10,136	146,496
Shantung	16,007	5,400	6,918	412	28,737	22,284	25,815	6,950	412	55,461
Shansi	9,067	470	9,253	-	18,790	11,337	2,646	35,079	-	49,062
North Honan	4,929	425	-	-	5,354	8,008	1,772	380	-	10,160
North Kiangsu	97	920	-	-	1,017	1,632	8,230	7,239	-	17,101
Chahar-Suiyuan	-	-	16,445	-	16,445	-	750	39,327	-	40,077
Total	107,490	238,221	162,684	25,297	532,692	174,096	1,123,508	307,058	15,833	1,620,495

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Table 4. (Cont'd)

CAPITAL (thousand yuan)

Province or City	China	Japan	1942 Sino-Jap	Other	Total
T'ien-ching	103,123	405,722	66,801	3,072	578,718
Pei-p'ing	44,707	42,058	6,784	-	93,549
Ch'ing-tao	66,613	494,923	17,312	-	578,848
Hopeh	51,100	67,131	220,801	1,000	340,032
Shantung	33,674	57,571	45,033	1,960	136,238
Shansi	1,592	56,436	11,427	-	69,455
North Honan	1,573	8,169	12,089	-	21,931
North Kiangsu	1,802	10,153	3,008	-	24,963
Chahar-Suiyuan	-	750	51,327	-	52,077
Total	304,184	1,143,013	434,582	6,032	1,687,811

These two charts contain many revisions of the original statistics, as explained in three headings below:

1. The capital has many times been counted twice in the statistics we have used. For instance, a company has many branch factories (such as the various plants of the North China Tung-ya Tobacco Company, North China Communications Company, etc.). Many branch factories give the figures of the parent company, and of course this means duplication. In such cases we change to the plant's own amounts, or give the company figures as the sum for all the plants.

2. Some statistics on capital contain glaring mistakes. Thus the Korea-Japan Curtain Company in the 1939 clothing industry statistics employs eight or nine persons, produces only 272,000 yuan worth of goods, but has a capital of 50 million yuan — three times as large as the capital of the entire clothing industry. We correct this error by taking the average proportion of capital to workers and adjusting to the number of employes. Such errors are frequent.

3. Some plants state no figures for capital. We fill in according to the principle mentioned above. Most of these are small plants and the inserted figures cannot be far wrong.

However, these are rough estimates. In these four years the Chinese and Japanese capital is separately recorded for joint plants in Chahar-Suiyuan according to place; we have divided investments from Manchuria equally between the two. Most joint plants in the five provinces in North China have separated the Chinese and Japanese capital for the years 1939, 1940, and 1941, but not for 1942 (save for the hydroelectric). We know that Japanese investing had a guiding aim, namely that in joint plants Japanese capital should not exceed 51 percent; and as far as we know, they could obey this rule very well. When the proportion of Chinese and Japanese capital is not clear, we always assume that each took one half. Our results are shown in Table 5.

From Tables 3 and 5 we can observe the relative rise and fall as shown in Table 6.

Table 5. Sino-Japanese Industrial Capital in North China, by Industry

CAPITAL (Thousand yuan)

Type of Industry	1939 Plants	China	Japan	Total	1941 Plants	China	Japan	Total
Lumbering	-	-	-	-	-	-	-	-
Machine-making	2	875	1,125	2,000	5	1,840	2,090	3,930
Metal goods	3	3,528	3,826	7,354	4	3,597	27,959	31,556
Electric appliances	-	-	-	-	-	-	-	-
Communications	12	48,740	48,740	97,480	14	50,222	50,871	101,093
Earth & stone work	12	1,883	1,995	3,878	20	4,710	6,424	11,134
Hydroelectric	32	12,867	15,083	27,950	39	55,271	50,399	105,670
Chemical	11	2,503	4,690	7,193	12	3,639	6,474	10,113
Textile	6	3,302	3,303	6,605	9	2,766	2,266	5,032
Leather	1	350	350	700	4	2,183	2,319	4,502
Beverage and food	10	3,188	2,617	5,805	31	7,918	17,170	25,088
Paper & printing	3	1,560	2,159	3,719	7	3,468	4,972	8,440
Total	91	78,796	83,888	162,684	154	135,640	171,418	307,058

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Table 5. (Contd)

CAPITAL (thousand yuan)

Type of Industry	Plants	1942 China	1942 Japan	1942 Total	1,200
Lumbering	2	376	824	1,200	
Machine-making	6	1,504	1,754	3,258	
Metal goods	2	263	262	525	
Electric appliances	2	812	813	1,625	
Communications "	16	47,685	47,685	95,370	
Earth & stone work	26	8,595	7,781	16,376	
Hydroelectric	63	78,520	88,100	166,620	
Chemical	8	5,379	5,479	10,858	
Textile	22	32,252	31,751	64,003	
Leather	4	925	925	1,850	
Beverage and food	37	19,044	18,172	37,216	
Paper & printing	9	17,840	17,841	35,681	
Total	197	213,195	221,387	434,582	

Table 6. Changes in Industrial Capital (in 1,000 yuan)

Year	Chinese Capital	Japanese Capital	Other Foreign Capital	Total
1939	186,286	321,109	25,297	532,692
1941	309,736	1,294,926	15,833	1,620,495
1942	517,379	1,364,400	6,032	1,887,811

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IV. ESTIMATE OF PRODUCTION AND EMPLOYMENT IN NORTH CHINA INDUSTRIES

Due to scarcity of data, we have made several bold assumptions in these estimates.

We mentioned above that we have complete statistics of numbers of employees and value of production in the five provinces of North China only for the years 1939 and 1942. For 1940 and 1941 we have only statistics of production and merely general figures of employment. As to plants in Chahar-Suiyuan, we have statistics of price and employment for only three of the four years, and those are fragmentary. Employment and production statistics of individual hydroelectric plants are very complete except for nonprofit plants, about which we know nothing.

To get a complete picture of employment and production during these four years we must again draw upon our judgment. We must further explain that data on nonprofit subsidiary electric plants is very scanty. Our plan of calculating production is already rough enough and the amount of employment comes out of these none-too-trustworthy figures of production. Therefore, we have separately calculated this set of figures on production and employment, not adding them to the totals on the electric industry lest we increase the range of error in estimating these items for the whole industry. Thus we can get nearer to reality in comparing capital and employment of labor in each industry because in computing the number of plants and amount of capital we also have omitted figures for subsidiary plants. Following is an explanation of our method.

First, we can report on the estimates for 1939 and 1942. Figures on production and employment for 1939 and 1942 are relatively complete except that Chahar and Suiyuan do not have figures for 1942 nor on employment for 1939. Our estimate for employment in Chahar and Suiyuan for 1939 is derived from the annual value of production in each industry in the five provinces of North China for 1939, less that in Chahar-Suiyuan. In other words, we assume that for 1939 the annual production of each workman in the same industry was just the same in Chahar-Suiyuan as in the five provinces. This assumption can underestimate the employment in Chahar-Suiyuan because the value of annual production in the five provinces can be higher than in Chahar-Suiyuan, but we hope the error will not be too large.

As to production value in 1942, we assume that there was no change in real production between 1941 and 1942. Therefore, we merely need take the ratio of prices of manufactured goods in North China in 1941 and 1942, multiply by the cost of goods in 1941, and thus obtain the assumed value of goods in 1942 (Note 9). Our method for estimating the number of workers is just the same as for 1939. By adding hydroelectric employment and production to the figures thus obtained, we can get a complete picture of North China's industrial employment and production for the years 1939 and 1942. We have relatively complete statistics for employment and production in electric plants, and the proportionate weight of the hydroelectric industry is very small.

It is to be noted that there are a few mistakes in the 1939 and 1942 production and employment figures of North China. For instance, in the food industry for 1939, the production of the Hua-ch'ing Flour Company of Shantung is given in the original statistics as 297,000 yuan, while the entire flour industry of Shantung was only 26,804,000 yuan. This is clearly an error, to be corrected as soon as perceived. Table 7 shows our tabulated results.

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Table 7. Industrial Employment and Production in North China (1939 and 1942)

Type of Industry	1939 Workers Employed	1939 Value of Products (in thousand yuan)	1942 Workers Employed	1942 Value of Products (in thousand yuan)
Lumbering	2,102	11,241	4,857	51,751
Machine-making	3,505	3,714	12,585	32,310
Metal goods	4,878	13,493	11,302	54,949
Electric appliances	105	80	1,833	10,288
Communications	14,857	16,119	19,361	71,191
Earth & stone work	13,328	15,745	25,149	58,582
Hydroelectric	2,085	21,174	3,956	53,750
Chemical	13,261	37,974	10,457	88,727
Textile	67,397	237,949	75,364	826,643
Clothing	3,221	10,855	14,361	84,763
Leather	3,993	17,677	6,350	61,554
Beverage and food	12,499	128,630	26,365	588,400
Paper & printing	5,148	16,818	9,179	57,682
Ornaments	324	944	294	973
Miscellaneous	584	1,210	567	3,943
Total	147,887	553,123	226,380	2,045,506

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The 1939 and 1942 production and employment figures form a basis for estimating these items for 1940 and 1941. We said above that for the five provinces of North China we have statistics of amount for these years but not value of production. We cannot use amount of production to obtain value because:

1. Kinds of products are too many, and names of units too complex, so we cannot get an average price of each article for each year.

2. Production in the repair and finishing industry is the amount of repair and not of production; for example, in a railroad shop almost all the work is car repairs, whose individual value is hard to estimate.

3. Production statistics are incomplete, and some plants simply do not have production records; therefore, even if the two questions are easily solved, they are not completely solved.

For these three reasons we have decided to abandon the plan for getting value of production from its amount. Since amount is not a sufficient basis for estimating value, the only way is to begin from the workers' average annual production value.

Since we already have statistics for the number of workers, and if we can get the average annual production value of each worker, we can get the total value of production by multiplying these two items. In the statistics for 1940 and 1941 there is only one figure given for employment. We cannot admit that in those two years there was absolutely no change in this item because there is quite a change in the production for those years. To settle this question, we must once again employ our former ruling and say that the number of workers should represent conditions as of 1941. If this ruling is valid, employment for 1940 may be estimated in proportion to change in production as between 1940 and 1941. This is a risk attempt, but we feel our assumption does not go beyond editorial discretion. As to adding to the number of plant workers, there are no statistics in the original material; we assume there was no change between 1940 and 1941. The proportion of plants added is very small, hence the total figures for employment is little affected. Table 8 gives estimates for employment in 1940 and 1941.

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Table 8. Industrial Employment in the Five Provinces of North China (1940-1941)

Type of Industry	Number of Workers Employed 1940	1941
Lumbering	3,126	3,630
Machine-making	5,891	8,926
Metal goods	12,058	13,884
Electric appliances	555	818
Communications appliances	16,886	18,229
Earth & stone work	18,303	20,385
Hydroelectric	4,377	3,078
Chemical	16,116	16,454
Textile	61,272	68,972
Clothing	6,900	8,557
Leather	4,990	5,378
Beverage and food	19,178	24,965
Paper and printing	6,292	6,857
Ornaments	403	369
Miscellaneous	603	606
Total	176,950	199,108

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After obtaining the number of workers, the second question to be solved is the annual production value. Here we still use the above basic assumption: the workers' average annual production was the same during the four years. Any variation in value of production is due to price fluctuations. As to price index of North China's industrial products, we have no way to integrate those of various places, so we take that of T'ien-ching as prepresentative. If we take 1939 as the base period, price changes in the four years may be seen in the following table:

Year	Index
1939	100
1940	179
1941	204
1942	259

According to our statistics, the average annual production value of workers in 1939 was 3,600 yuan. If we take 1939 as the base period, the average production value then should be as follows:

Year	Annual Production Value (in thousand yuan)
1939	3.60
1940	6.44
1941	7.34
1942	9.32 (9.03)

The figure in parentheses was the average annual production for 1942 — only 3 percent /sic/ at variance from our estimate arrived at by inference, so our assumption is not too far from fact. If we take the average annual production for 1940 (6.44 thousand yuan) and for 1941 (7.34 thousand yuan) and multiply these by the respective numbers of workers, we get the total production values for those two years, as follows (Note 11):

Year	Production Value (in thousand yuan)
1940	1,139,558
1941	1,431,453

As to Chahar-Suiyuan, we have figures for production already in hand. We can get the numbers for employment in the same manner, thus:

Year	Number Employed	Production Value
1940	2,389	15,718
1941	3,251	39,543

By adding the figures for the five provinces and those for Chahar-Suiyuan we get the totals for all North China industries for the two years, as follows:

Year	Number Employed	Production Value
1940	179,339	1,155,276
1941	204,359	1,500,996

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The above figures do not include employment and production in subsidiary electric plants. These occupy a large place in the electric industry. We do not have these items for a single year, but we know in general their capacity. Actual amounts and their percentage as compared with independent plants is shown as follows:

Year	Actual Capacity (thousand kw)	Percentage of Independent Plants	
1940	157	88	(Note 12)
1941	175	74	(Note 13)
1942	175	64	(Note 13)
1943	183	65	(Note 14)

We can see from the above table that the proportion of subsidiary plant capacity in the total electric industry is gradually lessening. Our statistical period is 1939 to 1942. If we let 80 percent of the production value of the independent plants represent the average production value of the subsidiary plants during the four years, we will not be too low. The average production value of the independent plants during the four years was 31,327 thousand yuan, so that of the subsidiary plants should be 25,062 thousand yuan. Assuming that the workers' average annual production value is the same, the average number of persons employed should be 2,74[illegible].

V. TENTATIVE INDEX FIGURES FOR INDUSTRIAL CAPITAL, PRODUCTION, AND EMPLOYMENT IN NORTH CHINA

Having obtained estimates on these items for the 4 years 1939-1942, we want to make up some index figures. Those for employment are very easy, for having assumed equal efficiency, we need no personal corrections. Production and capital are otherwise because changes in the figures as the years go by are partly the result of price fluctuations. To get the real variations in production and capital, we must eliminate the factor of price fluctuation. We have already mentioned the index of prices of industrial goods as suitable to our immediate calculating of a production index. The choice of an index of capital costs awaits the result of our study of materials on hand, since we feel that a combination of index numbers of raw materials and nonconsumer goods is more ideal. These two index numbers have been worked out by the Japanese in their study of China problems and by the puppet Federal Reserve Bank. We work them out again using 1939 as the base period (Note 15):

Table 9. Index Figures of Capital, Production, and Employment in North China Industry (1939 = 100)

Year	CAPITAL		PRODUCTION			EMPLOYMENT	
	Value (thousand yuan)	Capital Price Index	Capital Index	Value (thousand yuan)	Industrial Goods Price Index	Production Index	No of Workers	Employment Index
1939	332,692	100	100	533,123	100	100	147,887	100
1940	-	176	-	1,155,276	179	121	179,339	121
1941	1,620,495	198	154	1,500,996	204	138	204,359	138
1942	1,887,811	249	142	2,045,506	259	148	226,360	153

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Year	Raw Materials	Nonconsumer Goods	Capital
1939	100	100	100
1940	170	181	176
1941	188	207	198
1942	259	238	249

The third column above is what we assume as index numbers for capital cost. With index numbers for industrial goods and capital cost, the making of index numbers for capital, production and employment in North China industries is purely a problem of calculation. The results are shown in Table 9.

These three index numbers can only represent the general picture, since our methods are frequently based on assumptions. Moreover, the index numbers of production and employment are indentical for the two years 1940 and 1941.

EXPLANATION OF NOTES

Note 1. Price trends in North China from 1943 to 1945 can be seen from the following table:

Year	Legal Price	Black Market Quotation
1936	100	100
Jul 1943	1,166	2,185
Aug 1945	36,730	392,805

Note 2. What we call Chahar-Suiyuan and what the Japanese called Meng-chiang are coterminous, except that Meng-chiang includes also a portion of the northern part of Shansi. This whole area is what we mean when we say Chahar-Suiyuan. When we speak of the five provinces of North China, this northern portion of Shansi is not included. Thus, when the two areas are combined, there is no duplication. Our data compels this arrangement.

Note 3. T'ien-ching's share in North China may be shown in the following table:

	1939	1942
Plants	19.7%	30.0%
Capital	25.5	30.7
Workers	31.9	30.6
Production	29.9	36.2

If we take 1942 as nearest the facts, we see two features: (1) there has been a large decrease in the number plants for 1939; (2) the decrease was in small plants, since the proportion under other headings is maintained for the two dates. These points coincide with our judgment.

Note 4. The plants studied numbered only 387. But in 1939 there were 763 plants employing 30 or more persons. There must have been many omissions of small plants.

Note 5. Compare "A Study of Actual Conditions in the Textile Industry

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of Ch'ing-tao (Tsingtao)."

Note 6. See "Present and Future Electric Industry of North China" (Government report).

Note 7. Coke ovens may make gas as a by-product but do not belong in this list.

Note 8. See Economic Research Bureau of South Manchuria Railway. "Capital Needed for Investment in North China Indsutries."

Note 9. For price-index number we use the North China wholesale price index of industrial goods, with a ratio of 1.3 to 1 for 1942-1941.

Note 10. Statistics from 1939 to July 1942, prepared by T'ien-ching Investigation Bureau of Chinese Problems; after July 1942, prepared by the puppet Chinese Federal Reserve Bank, using 1936 as basic period. Revised for present table. Source of data, "Annual Reports of T'ien-ching Prices, 1913-1942," by the puppet Federal Reserve Bank.

Note 11. We do not seek values in single industries, but totals, because index figures of prices in various industries cannot be found. Under such conditions, to seek individual costs is risky and meaningless.

Note 12. Compare "Table of North China Electric Plants,"

Note 13. Compare "Expansion of North China Mining Industry During the War" (typed MS), Chapter on electric enterprises.

Note 14. Compare "Present and Future of the Electric Industry in North China" (typed MS), by_____.

Note 15. Compare "T'ien-ching Annual Price Reports."

Note 16. For example, plants and capital added in 1941 are sometimes reckoned at the 1939 price, sometimes at the 1932 (TN, prob. 1942) price; we have counted them all at the 1941 price. The index number obtained cannot easily represent the true changes in capital.

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